

Watershed Restoration Planning and Monitoring; the Meacham Creek Example

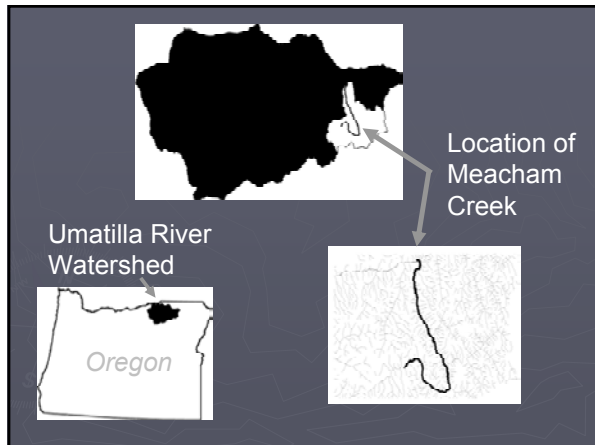
James G. Webster
Fisheries Habitat Program

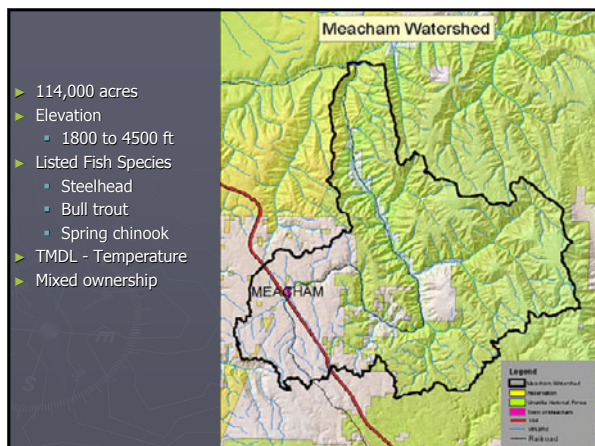
Confederated Tribes of the Umatilla Indian Reservation



JamesWebster@ctuir.com

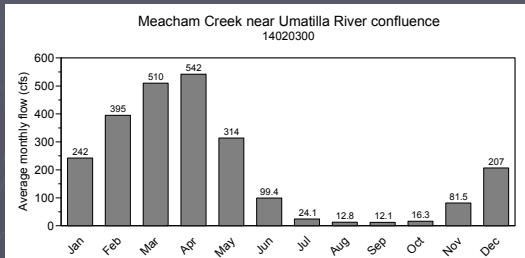
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Climate Regime

- ▶ 25 to 40 inches of precipitation
- ▶ Snow dominated above 3500 feet
- ▶ Rain-on-snow events at mid to lower elevations



Issues and Concerns

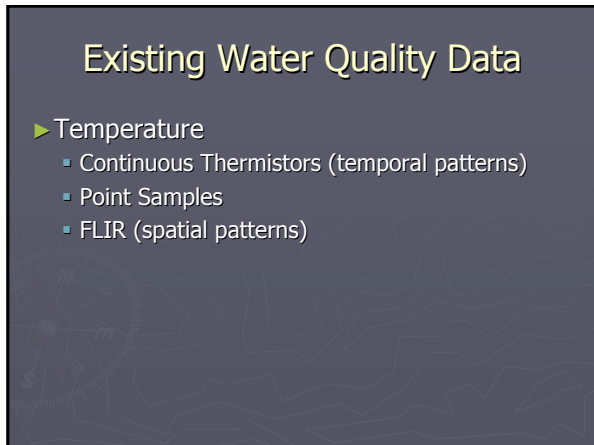
Railroad and
Related Infrastructure

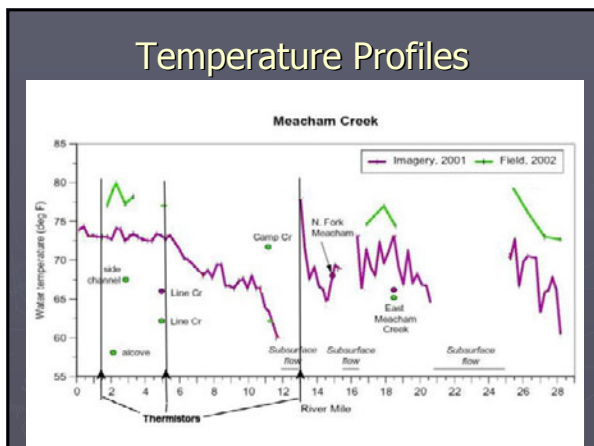


Issues and Concerns Channel Form



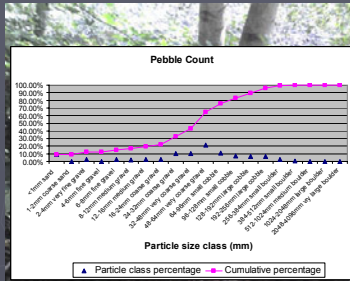






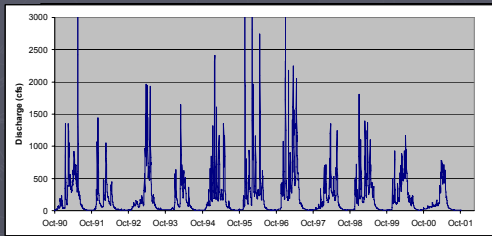
Existing Water Quality Data

- Temperature
- Sediment
 - ISCO
 - Bedload Sampling



Existing Water Quality Data

- Temperature
- Sediment
- Discharge



Assessment

- To better understand ecological and hydrological conditions.
- Assessment Tasks to be completed:
 1. Identify historical watershed conditions
 2. Describe current watershed conditions
 3. Identify impacts to hydrological functions and processes

Stream: **Lower Meacham Creek** Reach code: **4b**
Survey date: **July, 2002**
Nominal river mile: **7.0** Actual river mile: **7.08**
Drainage area (sq.mi.): **15.1**
Average annual precipitation, area-weighted (in.): **35.5**
Elevation at cross section (ft.): **2058**
10-year peak flow (cfs): **432**
1.5-year or bankfull peak flow (cfs): **2018**
Channel gradient, upstream of cross section (ft./ft.): **0.009**
Stream power index for 1.5-year peak flow: **17.7**
D15 D34 D50 D84 D95
Substrate size (in.) **0.9 1.4 1.8 -**
D-50 substrate class: **gravel**
Channel sinuosity, upstream of cross section (ft./ft.): **1.12**

Floodprone surface width (ft.): **634**
1.5-year or bankfull surface width (ft.): **287**
Entrenchment ratio: **2.2**
1.5-year or bankfull mean water depth (ft.): **1.9**
Ratio of 1.5-year surface width to mean depth: **151**
Summer width (ft.): **34**
Active channel width for the 10-year flow (ft.): **591**
Rosen Level II channel type: **D3**

	10-year flow	1.5-year flow
Shear (psf)	1.11	0.93
Velocity (ft/s)	5.4	4.6
Surface width (ft)	471	287
Cross-section area (sq.ft.)	844	430

Andrus & Middel, 2003

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Andrus & Middel, 2003

Figure 1 is a line graph showing the elevation profile of the Meacham Creek watershed. The Y-axis represents Elevation (feet) from 2150 to 2850. The X-axis represents Distance (miles) from 0 to 11. The profile starts at approximately 2180 feet at 0 miles and rises to about 2800 feet at 10 miles. Key points on the profile are labeled with creek names and their respective elevations: Camp Cr. (2250 ft), Meacham Creek (2280 ft), North Fork Meacham Cr. (2450 ft), East Meacham Cr. (2650 ft), and Meacham Creek (2750 ft). The profile is divided into segments with slopes of 1.1%, 1.0%, 1.7%, 1.1%, 1.4%, 1.2%, and 1.4%.

Distance (miles)	Elevation (feet)	Creek Name	Slope (%)
0	2180		
1.1	2250	Camp Cr.	1.1
1.2	2280	Meacham Creek	
2.2	2380		1.0
4.7	2450	North Fork Meacham Cr.	1.7
5.8	2560		1.1
7.2	2650	East Meacham Cr.	1.4
8.2	2720		1.2
9.2	2750	Meacham Creek	
10.2	2800		1.4

Meacham Creek

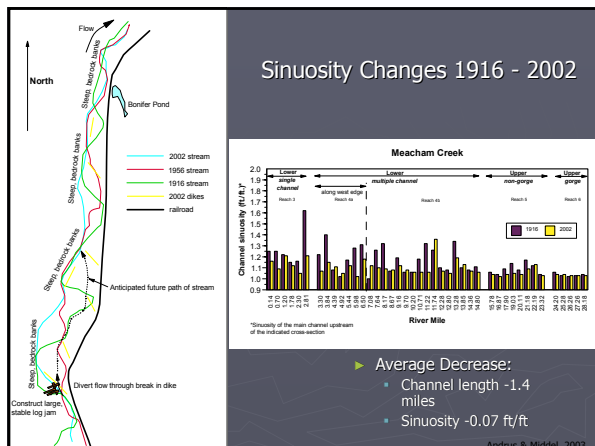
Valley floor width (feet)

— Before railroad
— After railroad

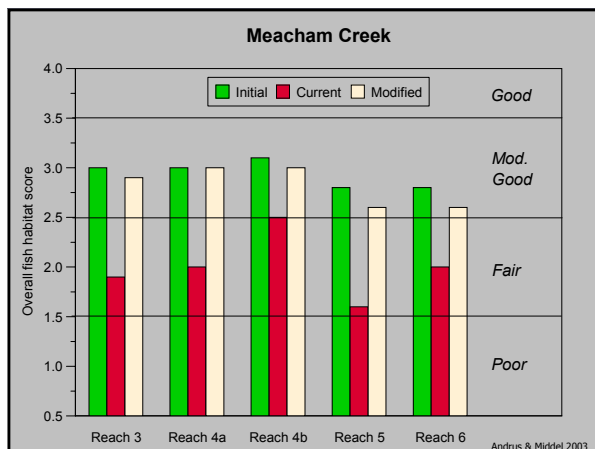
River Mile

Andrus & Middel, 2003

River Mile	Before railroad (feet)	After railroad (feet)
0	1300	1250
1	750	750
2	1000	400
3	1000	800
4	700	600
5	900	600
6	950	800
7	900	750
8	1100	900
9	1250	900
10	1250	650
11	1000	1050
12	1150	650
13	1100	1100
14	850	650
15	1000	700
16	800	450
17	450	250
18	250	250
19	250	250
20	250	250
21	250	300
22	450	350
23	400	350
24	200	150
25	150	100
26	100	100
27	100	100
28	100	100





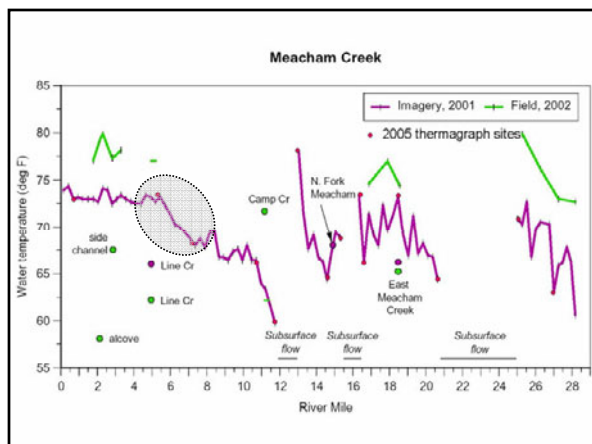


Assessment Results

- ▶ Lack of large woody debris and source
- ▶ Poor channel form in specific areas
- ▶ Constrained channel and disconnected floodplain
- ▶ Poor riparian vegetation coverage and conditions
- ▶ High water temperatures and high rate of heating

Monitoring Actions

- ▶ Temperature Monitoring
 - Longitudinal thermistors



Paired Thermistor Sites

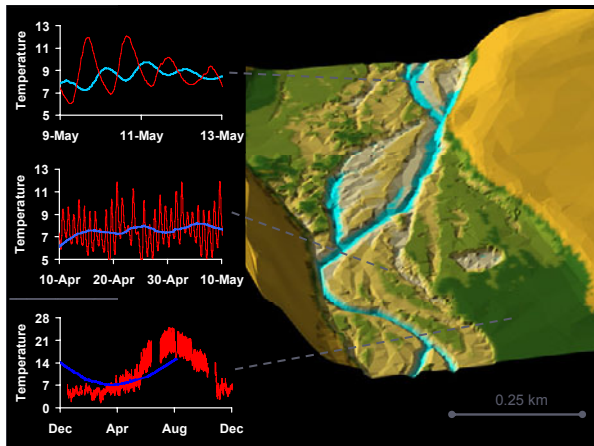


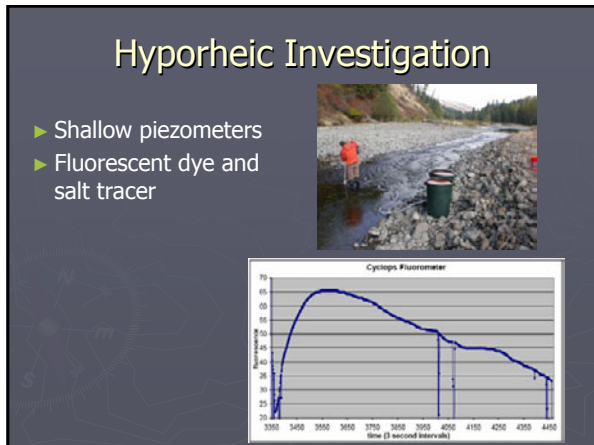
Monitoring Actions

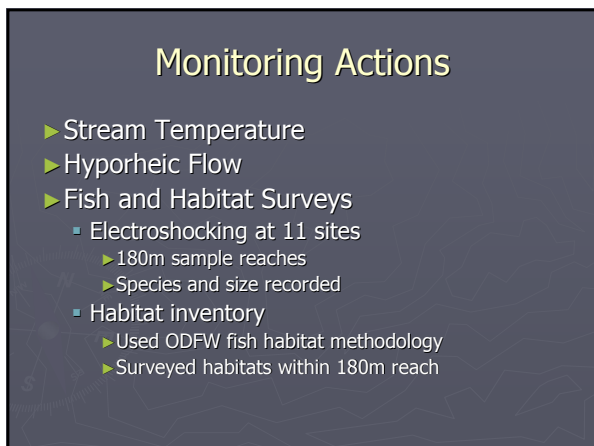
- Stream Temperature
- Hyporheic Flow
 - Measure of residence time
 - Evaluate flowpaths

Hyporheic Investigation Sites





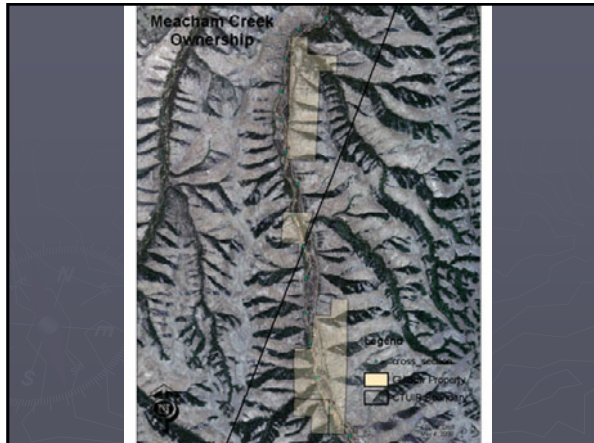




Restoration Activities

Restoration actions are intended to achieve objectives.

1. Riparian easement / riparian pasture development.
2. Whole conifer tree additions to channel and floodplain.
3. Levee reduction and/or removal within the floodplain.
4. Channel form and sinuosity improvement.
5. Riparian planting and noxious weed treatment

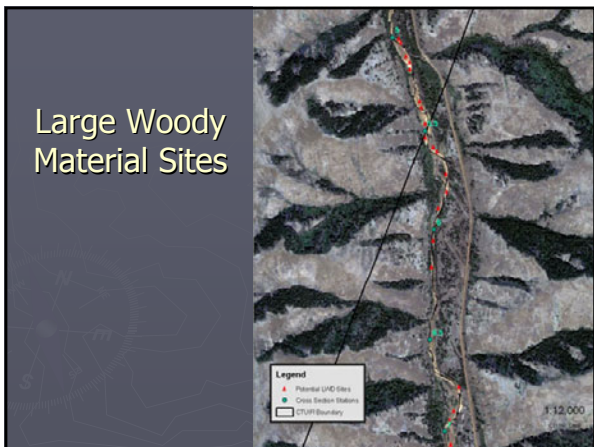




Whole Tree Additions









Funding Sources

- ▶ EPA NPS Clean Water Act 319 Funding
 - Assessment and Action Plan development
 - Botanist support
 - Large wood placement
- ▶ Clean Water Act Section 106
 - Channel morphology
 - Water quality monitoring
- ▶ General Assistance Program
 - Supporting Water Quality Monitoring

Matching Funds

- ▶ Blue Mountain Habitat Restoration Council
 - Union Pacific Railroad Mitigation
- ▶ Bonneville Power Administration
- ▶ Pacific Coastal Salmon Recovery Fund
 - Columbia River Inter-Tribal Fish Commission
 - NOAA Fisheries
- ▶ Natural Resource Conservation Service
- ▶ Oregon Department of Transportation
